

WHAT IS CLAIMED IS:

1. A face detection method, suitable for use in a video sequence, comprising:
receiving an image data in a YCbCr color space;
using a Y component of the image data to analyze out a motion region;
5 using a CbCr component of the image to analyze out a skin color region;
combining the motion region and the skin color region to produce a face candidate;
date;
performing an eye detection process on the image to detect out eye candidates;
and
10 performing an eye-pair verification process, to find an eye-pair candidate from
the eye candidates, wherein the eye-pair candidate is also within a region of the face
candidate.

2. The face detection method of claim 1, in the step of using the CbCr component of the image, wherein a Cb value is between 77 and 127, and a Cr value is between
15 133 and 173.

3. The face detection method of claim 1, wherein the step of using the Y component of the image data comprises:
performing a frame difference process on the image for the Y component,
wherein an infinite impulse response type (IIR-type) filter is applied to enhance the
20 frame difference, so as to compensate a drawback of the skin color region.

4. The face detection method of claim 1, further comprising a labeling process to label a face location, so as to eliminate the face candidate with a relatively smaller label value.

5. The face detection method of claim 1, wherein the step of performing the eye detection process comprises:

checking an eye area, wherein the eye area out of a range is eliminated;

checking a rate of the sys area, wherein a preliminary eye candidate with a long shape is eliminated; and

checking a density regulation, wherein each of the eye candidates has a minimal rectangle box to fit the eye candidate, and if the preliminary eye candidate has a small area but a large MRB, the preliminary eye candidate is eliminated.

6. The face detection method of claim 1, wherein the step of performing the eye-pair verification process comprises:

finding out a preliminary eye-pair candidate by considering an eye-pair slop within $\pm 45^\circ$;

eliminating the preliminary eye-pair candidate when eye areas of two eye candidate of the preliminary eye-pair candidate has a large ratio;

producing a face polygon based on the preliminary eye-pair candidate, and eliminating the preliminary eye-pair candidate when the face polygon is out of a region of the face candidate; and

setting an luminance image in a pixel area, wherein the luminance image includes a middle area and two side areas, wherein a difference between an averaged luminance value in the middle area and an averaged luminance value in the two side areas are computed and if the difference is with a predetermined range then the preliminary eye-pair candidate is the eye-pair candidate.

7. The face detection method of claim 6, wherein after the eye-pair candidate is determined and when multiple face polygons are overlapped, a face symmetric verification is further performed.

5 8. The face detection method of claim 7, wherein the number E of edge pixels of an eye image of the eye-pair candidate is divided by a symmetrical difference S, so as to produce a face-score value, wherein one of the face polygons with the largest face-score value is the selected one.

9. The face detection method of claim 6, wherein the face polygon include a rectangle or a square.

10 10. The face detection method of claim 6, wherein the luminance image is a 20 × 10 image area in pixel unit.

11. The face detection method of claim 10, wherein the middle area is the middle 8 pixels along a long side.

12. The face detection method of claim 10, wherein the middle area is to reflect
15 a region between two eyes.

13 A face detection method, comprising:
receiving an image data in a color space;
using a first color component of the image data to analyze out a motion region;
using a second color component of the image to analyze out a skin color region;
20 combining the motion region and the skin color region to produce a face candidate;
performing an eye detection process on the image to detect out eye candidates;
and

performing an eye-pair verification process, to find an eye-pair candidate from the eye candidates, wherein the eye-pair candidate is also within a region of the face candidate.

14. A face detection method on an image, comprising:

5 detecting a face candidate;

performing an eye detection process on the image to detect out at least two eye candidates; and

performing an eye-pair verification process, to find an eye-pair candidate from the eye candidates, wherein the eye pair candidate is also within a region of the face candidate.

10 15. The face detection method of claim 14, wherein the step of performing the eye detection process comprises:

checking an eye area, wherein the eye area out of a range is eliminated;

15 checking a rate of the sys area, wherein a preliminary eye candidate with a long shape is eliminated; and

checking a density regulation, wherein each of the eye candidates has a minimal rectangle box to fit the eye candidate, and if the preliminary eye candidate has a small area but a large MRB, the preliminary eye candidate is eliminated.

20 16. The face detection method of claim 14, wherein the step of performing the eye-pair verification process comprises:

finding out a preliminary eye-pair candidate by considering an eye-pair slop within $\pm 45^\circ$;

eliminating the preliminary eye-pair candidate when eye areas of two eye candidate of the preliminary eye-pair candidate has a large ratio;

producing a face polygon based on the preliminary eye-pair candidate, and eliminating the preliminary eye-pair candidate when the face polygon is out of a region
5 of the face candidate; and

setting an luminance image in a pixel area, wherein the luminance image includes a middle area and two side areas, wherein a difference between an averaged luminance value in the middle area and an averaged luminance value in the two side areas are computed and if the difference is with a predetermined range then the preliminary
10 eye-pair candidate is the eye-pair candidate.

17. The face detection method of claim 16, wherein after the eye-pair candidate is determined and when multiple face polygons are overlapped, a face symmetric verification is further performed.

18. The face detection method of claim 16, wherein the face polygon comprises
15 a rectangle or a square.